

# **PROCESS EVALUATION OF THE COBRE PROGRAM**

## **Key Findings**

Submitted by Carlyn Consulting to the  
National Center for Research Resources (NCRR), NIH

September 2008

## **Purpose of the COBRE program**

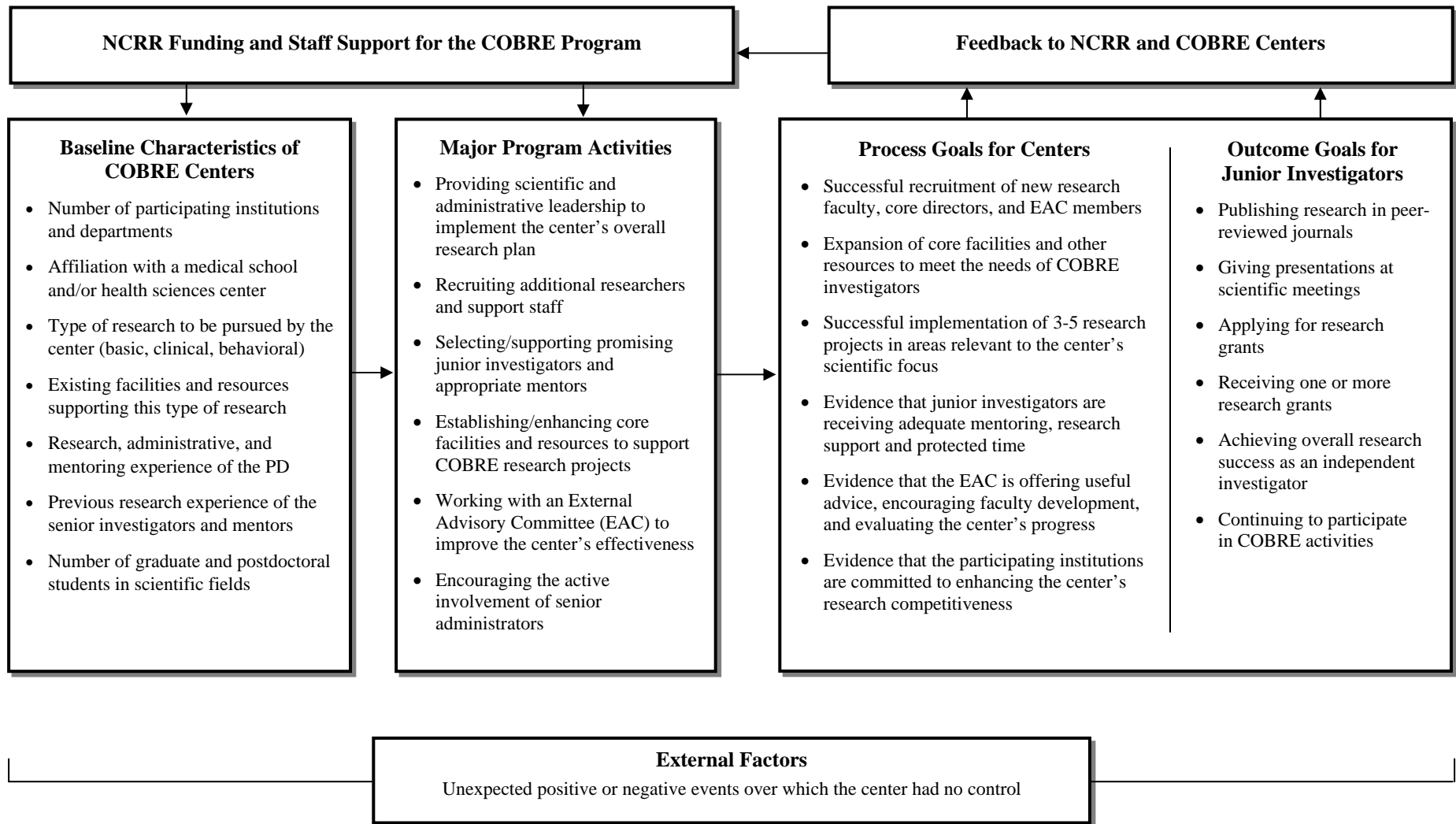
- Establish multidisciplinary biomedical research centers in IDeA states (those with 'historically low aggregate success rates' in obtaining NIH grants)
- Strengthen the infrastructure of participating institutions
- Enhance the research competitiveness of their research scientists, especially junior investigators

## Evaluation design

- Based on a conceptual framework identifying the program's goals and the predictor variables likely to be related to program success
- 6 study questions were addressed
- 2 target populations:
  - Initial cohort of 19 centers awarded a COBRE grant in Sept 2000 (n=18 since WY's centers shared many resources)
  - 107 junior investigators at these centers who received substantial COBRE support during Years 1-3 and did not have an R01 before joining the program

Exhibit 1

## CONCEPTUAL FRAMEWORK FOR THE PROCESS EVALUATION OF THE COBRE PROGRAM



## **Q1. What were the characteristics of the centers when they joined the COBRE program?**

- Most were collaborative partnerships (avg = 2.1 institutions and 4.8 departments per center in Year 1); 15 centers had a formal affiliation with a med school and/or major medical center
- All focused primarily on basic research; 7 centers were also interested in clinical research
- All had existing research resources but most needed additional core facilities, renovation, and upgraded instrumentation
- All PDs were accomplished researchers (with one exception); wide variation in number of experienced investigators at baseline (ranging from 2 to 11)
- Great variation in size of postdoc and grad student pool (avg = 76 postdocs, 916 graduate science students)

### Exhibit 3

Process Evaluation of the COBRE Program

## **COBRE Centers' Access to Medical Centers and Graduate/Postdoctoral Students in Scientific Fields at Baseline (FY 2000)**

| <b>COBRE</b> | <b>Lead Institution</b>                               | <b>Med Schools and Major<br/>Medical Centers<br/>Participating in COBRE</b> | <b># Graduate<br/>Science<br/>Students<sup>1</sup></b> | <b># Postdocs<br/>in Science<br/>and Health<br/>Fields<sup>1</sup></b> |
|--------------|---|---|--|--|
| <b>AR1</b>   | University of Arkansas                                | University of Arkansas for<br>Medical Sciences (UAMS)                       | 837  | 74   |
| <b>DE1</b>   | University of Delaware                                | None  | 994  | 100  |
| <b>ID1</b>   | University of Idaho                                   | Boise VA Medical Center   | 715  | 24   |
| <b>KS1</b>   | University of Kansas -<br>Lawrence                    | University of Kansas Medical<br>Center (KUMC)                               | 3,631  | 250  |
| <b>KY1</b>   | University of Louisville                              | University of Louisville School<br>of Medicine                              | 769  | 105  |
| <b>KY2</b>   | University of Kentucky                                | University of Kentucky College<br>of Medicine                               | 1,233  | 205  |
| <b>ME1</b>   | Maine Medical Center<br>Research Institute<br>(MMCRI) | Maine Medical Center Research<br>Institute (MMCRI)                          | 459  | 70   |
| <b>MT1</b>   | University of Montana                                 | None  | 1,025  | 77   |
| <b>NE1</b>   | University of Nebraska at<br>Lincoln                  | University of Nebraska Medical<br>Center (UNMC)                             | 1,971  | 193  |
| <b>NV1</b>   | University of Nevada Reno                             | University of Nevada School of<br>Medicine                                  | 730  | 0  |

| <b>COBRE</b> | <b>Lead Institution</b>                               | <b>Med Schools and Major Medical Centers Participating in COBRE</b>   | <b># Graduate Science Students<sup>1</sup></b> | <b># Postdocs in Science and Health Fields<sup>1</sup></b> |
|--------------|---|---|--|--|
| <b>OK1</b>   | University of Oklahoma Health Sciences Center (OUHSC) | University of Oklahoma Health Sciences Center (OUHSC)<br>Oklahoma State University Center for Veterinary Health Sciences  | 2,042  | 153  |
| <b>OK2</b>   | Oklahoma Medical Research Foundation (OMRF)           | Oklahoma Medical Research Foundation (OMRF)<br>University of Oklahoma Health Sciences Center (OUHSC)<br>Oklahoma State University Center for Veterinary Health Sciences | 2,042  | 153  |
| <b>PR1</b>   | University of Puerto Rico - Medical Sciences Campus   | University of Puerto Rico - Medical Sciences Campus   | 1,285  | 7  |
| <b>RI1</b>   | Brown University                                      | Brown University Medical School   | 671  | 65   |
| <b>SD1</b>   | University of South Dakota School of Medicine         | University of South Dakota School of Medicine   | 195  | 4  |
| <b>VT1</b>   | University of Vermont College of Medicine             | University of Vermont College of Medicine   | 450  | 90   |
| <b>WV1</b>   | West Virginia University                              | West Virginia University School of Medicine<br>Marshall University School of Medicine   | 1,442  | 44   |
| <b>WY1/2</b> | University of Wyoming                                 | None  | 643  | 69   |

<sup>1</sup> National Science Foundation, Division of Science Resources Statistics, Graduate Students and Postdoctorates in Science and Engineering, Fall 2000. <http://www.nsf.gov/statistics/nsf02314/>

## **Q2. How did the COBREs implement the major activities recommended by NCRR?**

- 11 centers actively recruited junior and senior investigators and 7 focused only on junior investigators; great variation in size of startup packages (largest = \$400K from COBRE and other sources)
- Some centers offered 1- to 2-year pilot project awards (\$8K-\$100K)
- Most centers held work-in-progress meetings, workshops on different topics, and annual retreats/symposia; most found they needed to strengthen their mentoring program after 2-3 years
- All COBREs recruited an EAC of accomplished researchers and met with them 1-2 times/year (sometimes by conf call); nearly all EACs expressed enthusiasm for their center
- 16 centers established an IAC and met with them 2-4 times/year

### **Q3. How successful were the COBREs in achieving the process goals for centers?**

- 86 investigators recruited during Years 1-6 (>90% into tenured or tenure-track positions); overall retention of junior investigators was high (70-80%)
- 11 centers created permanent academic positions (avg = 2.5 new positions); 5 new PhD and 2 MD/PhD programs launched
- 11 centers developed new core facilities (21 new cores, 39 enhanced cores, 5 new research buildings); 6 centers received C06 grants and 14 received COBRE supplements to expand space
- More subprojects implemented than expected (avg = 10.9); 81% of subprojects directed by a junior investigator
- 81% of junior investigators were mentored; avg release time = 41%; 41% had at least 1 postdoc

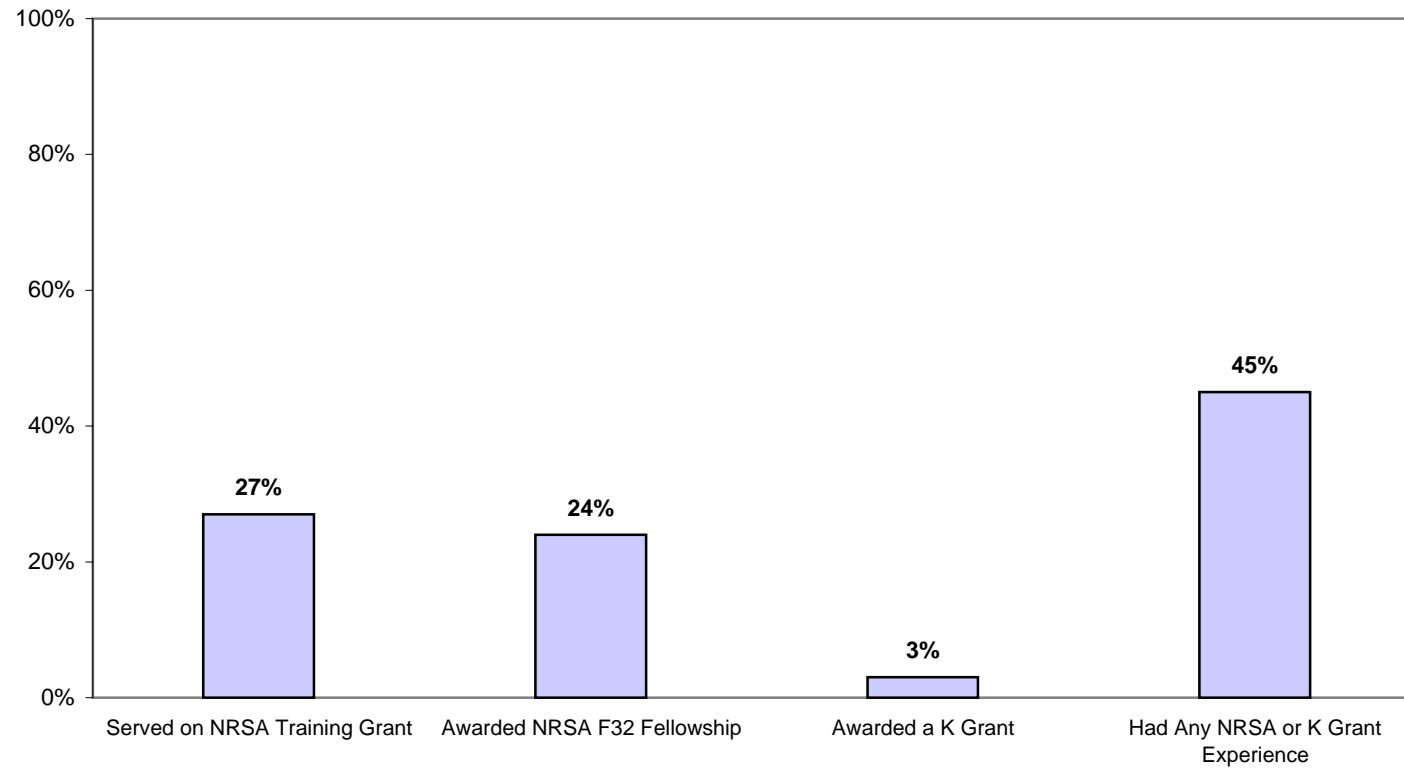
## **Q4. What were the characteristics of the COBRE junior investigators when they joined the program?**

- More males than females (72% vs. 28%)
- Mostly PhDs (91%) + 5% MD/PhDs + 3% MDs + 1% DVM/PhDs
- Several years of research training experience:
  - Average = 8.0 years since completing doctorate
  - Nearly all had been postdocs
  - 45% had served on a T32, F, or K grant
- Substantial experience publishing in scientific journals (avg = 1.4 articles/year, 99% first authors, 57% senior authors)
- Some experience with grant applications/awards; 65% had applied for a PHS grant, 42% were successful (mostly F32s); 30% had applied for an R01, 0% were successful

Exhibit 14

Process Evaluation of the COBRE Program

**Percent of Junior Investigators with Previous NRSA or K Grant Experience**

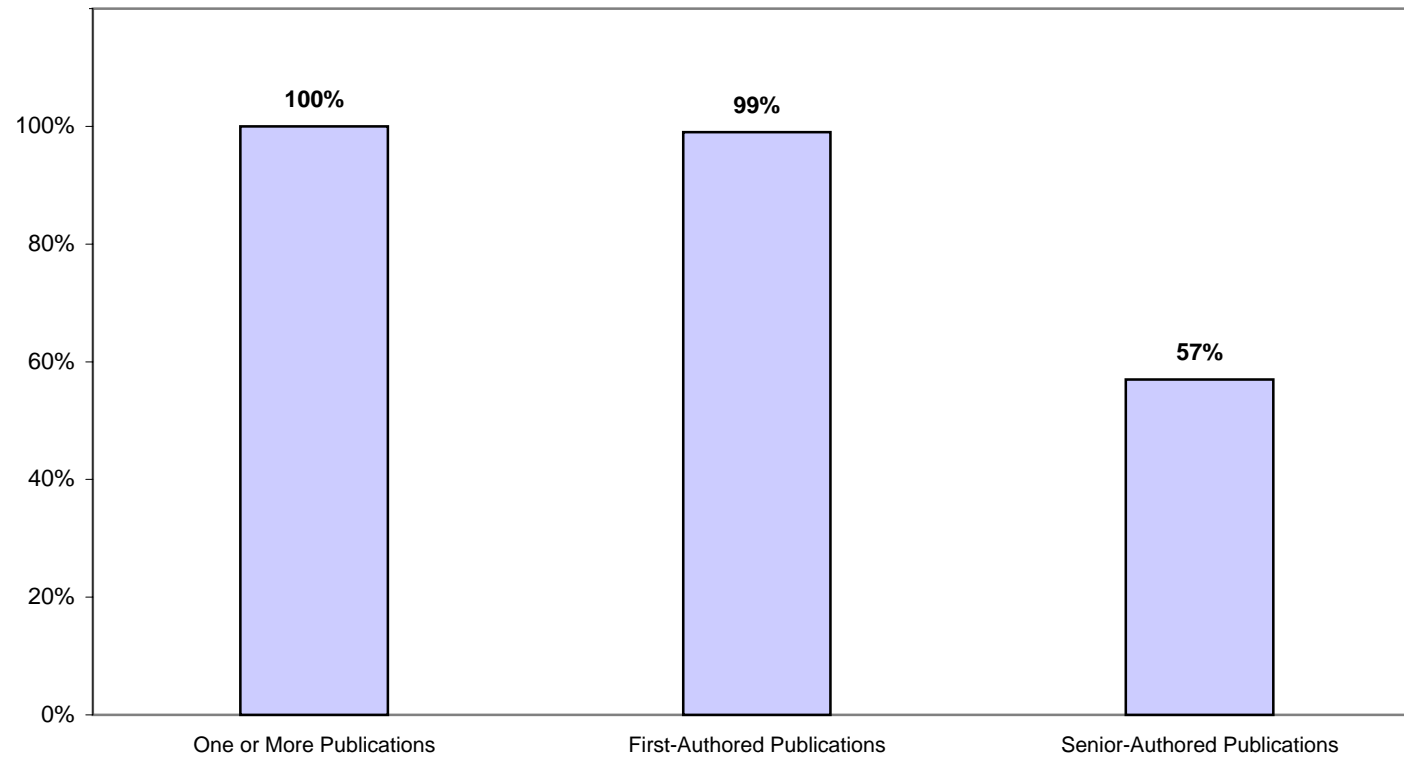


Based on an analysis of non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107). Data source: IMPAC II.

Exhibit 15

Process Evaluation of the COBRE Program

**Percent of Junior Investigators with Previous Scientific Publications**

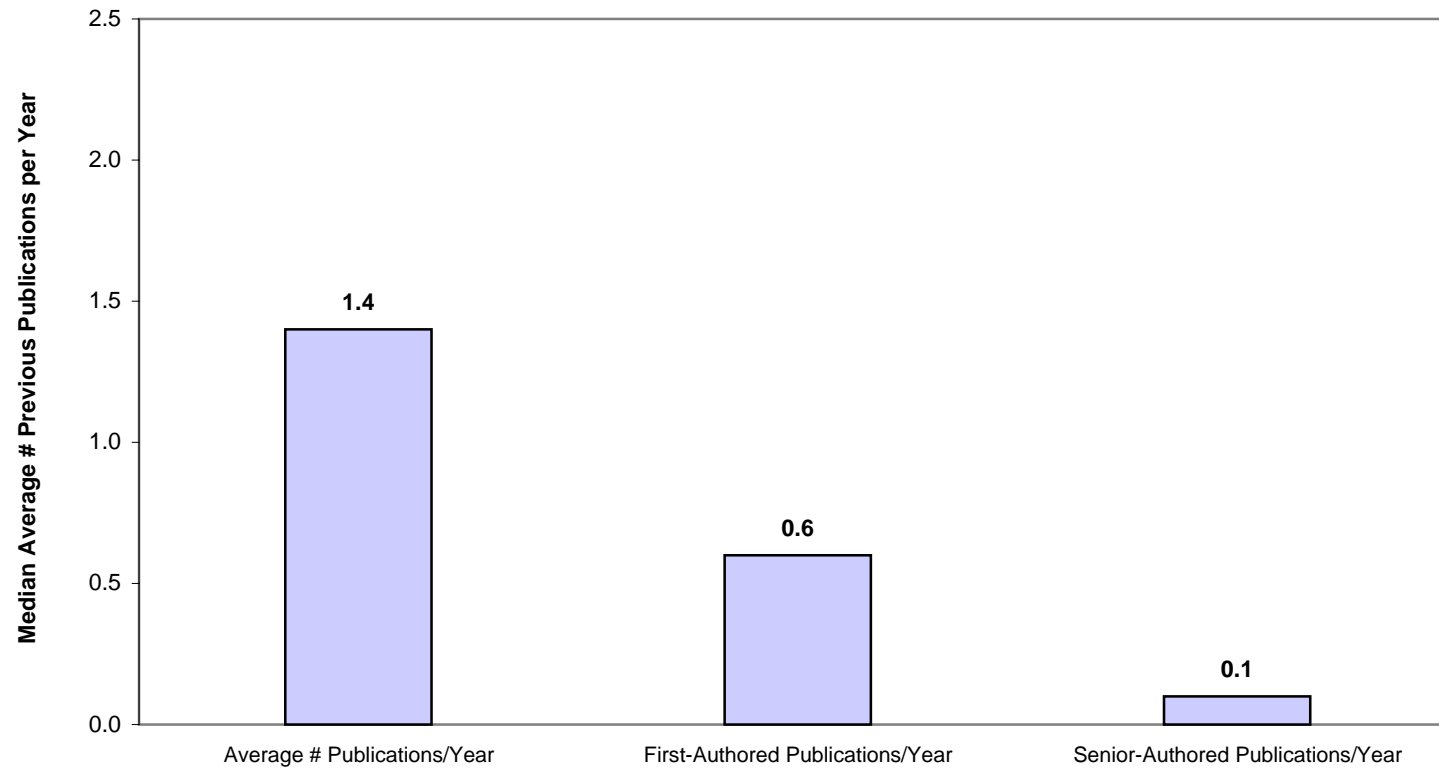


Based on an analysis of non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107). Sole-authored articles were counted as first-authored but not senior-authored publications. Data source: PubMed.

Exhibit 17

Process Evaluation of the COBRE Program

**Junior Investigators' Average Number of Previous Publications Per Year**

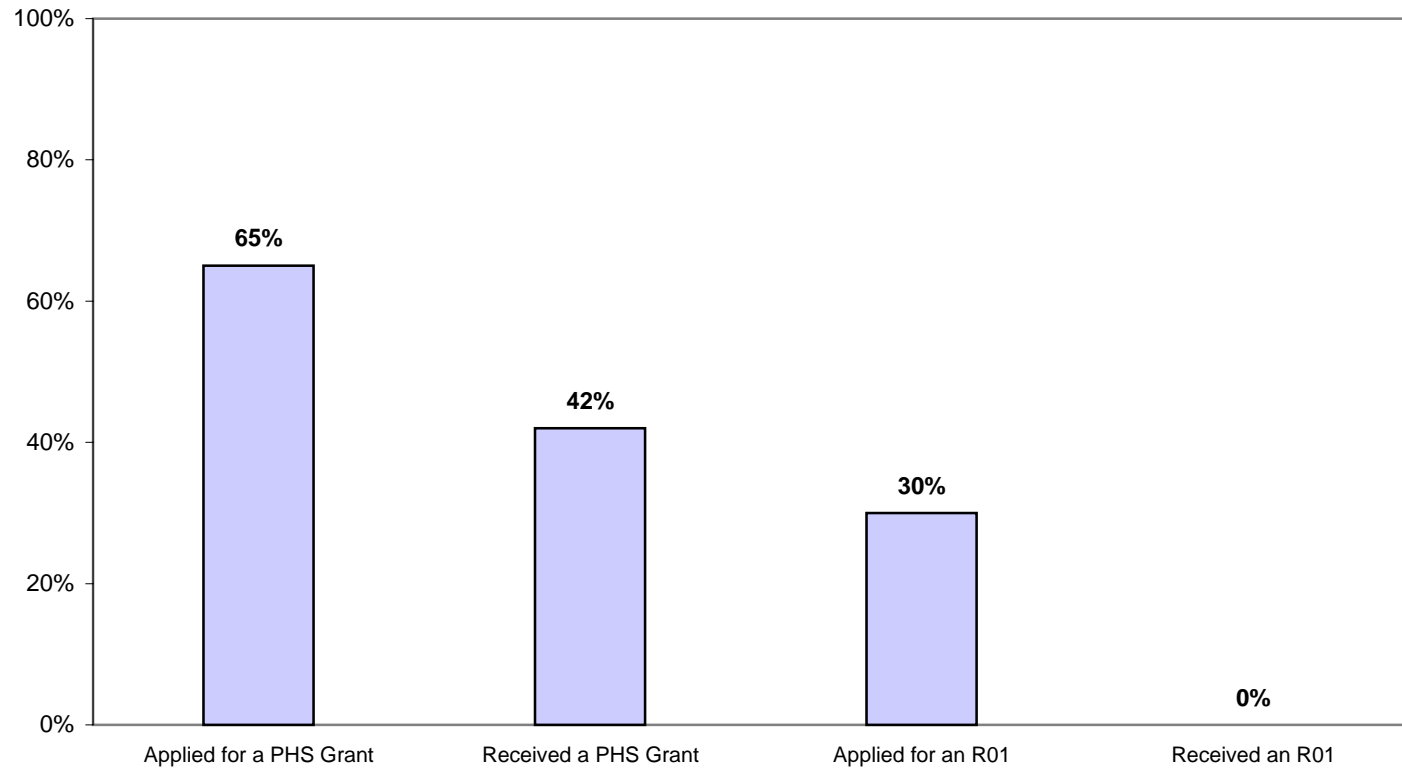


Based on an analysis of non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107). Sole-authored articles were counted as first-authored but not senior-authored publications. Data source: PubMed.

Exhibit 18

Process Evaluation of the COBRE Program

**Percent of Junior Investigators with Previous PHS Grant Applications and Awards**



Based on an analysis of non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107). PHS subprojects were counted as grants. Data source: IMPAC II.

## **Q5. How successful were the COBRE junior investigators in achieving the program's goals?**

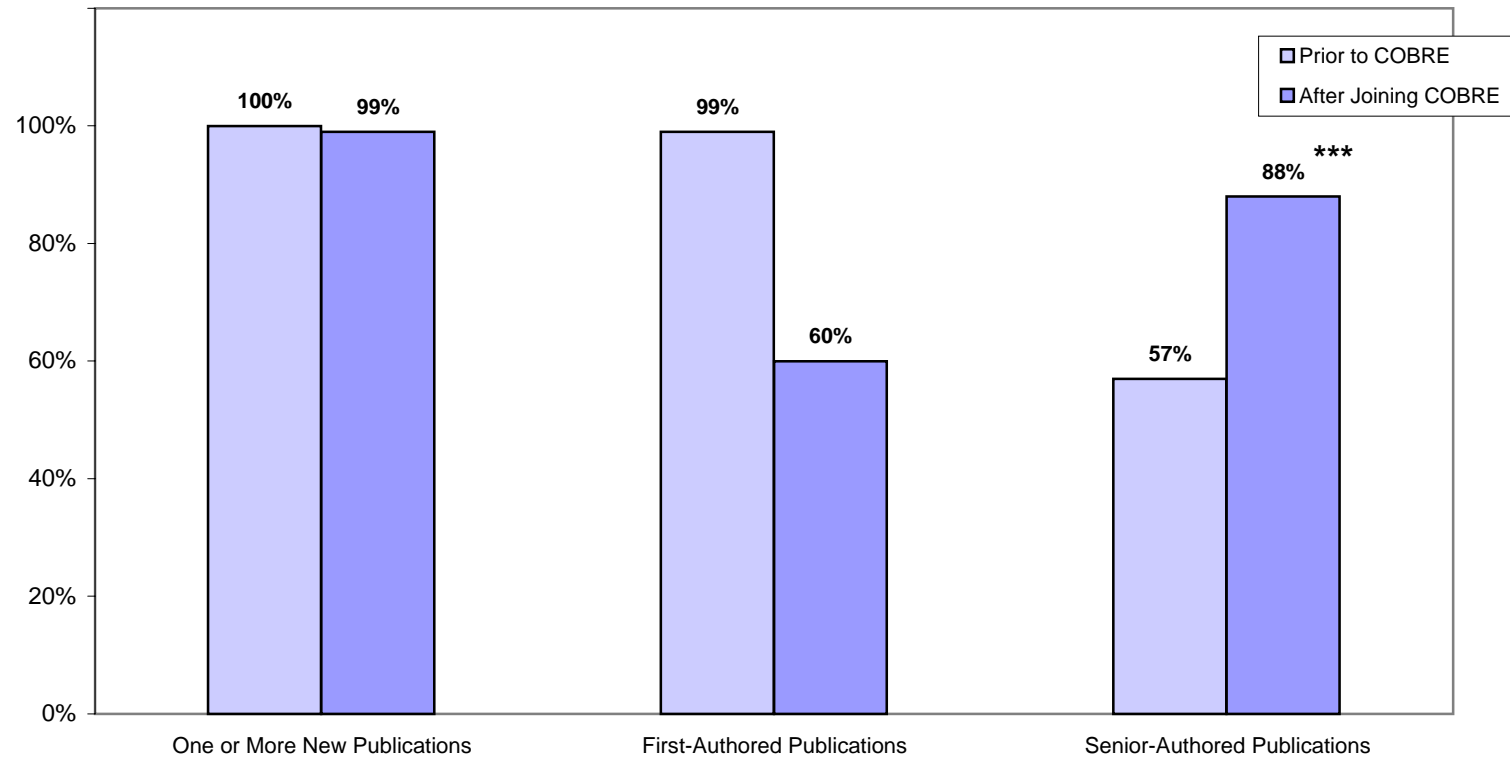
- 99% published in scientific journals, averaging 2.0 articles/year\*\*\*
- Major change in authorship patterns; 60% had new first-authored articles and 88% had new senior-authored articles\*\*\*
- 88% applied for a PHS grant, 65% were successful (mostly R-type grants)\*\*; 80% applied for an R01, 40% were successful\*\*\*; 24% received a large non-PHS grant; 36% received a smaller non-PHS grant
- 79% of junior investigators had a tenured or tenure-track position
- Only 7% left research during Years 1-6 (some temporarily)
- Surprisingly, the only baseline characteristic predictive of future success was having applied for an R01\*\*

\*\*\*Significant improvement in performance since joining COBRE ( $p < .001$ ), \*\*( $p < .01$ )

Exhibit 19

Process Evaluation of the COBRE Program

**Percent of Junior Investigators Who Published After Joining COBRE  
(Compared to Pre-COBRE Performance)**



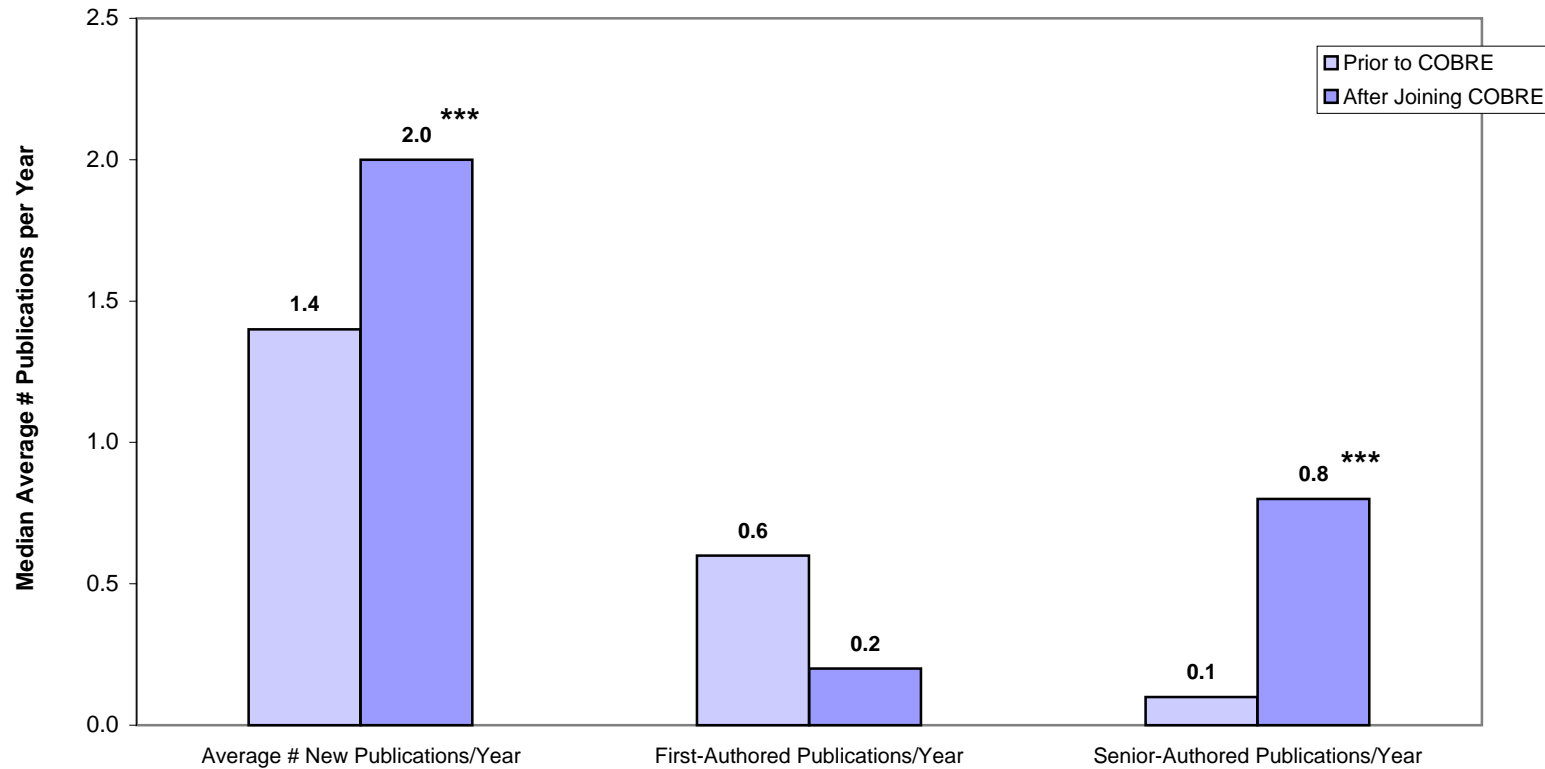
\*\*\* Significant improvement in performance ( $p < .001$ ).

Based on an analysis of the peer-reviewed scientific articles published by the non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107), comparing their performance before and after they joined the program (through Sept 2007). Sole-authored articles were counted as first-authored but not senior-authored publications. Data source: PubMed.

Exhibit 20

Process Evaluation of the COBRE Program

**Average Number of Publications Per Year  
(Compared to Pre-COBRE Performance)**



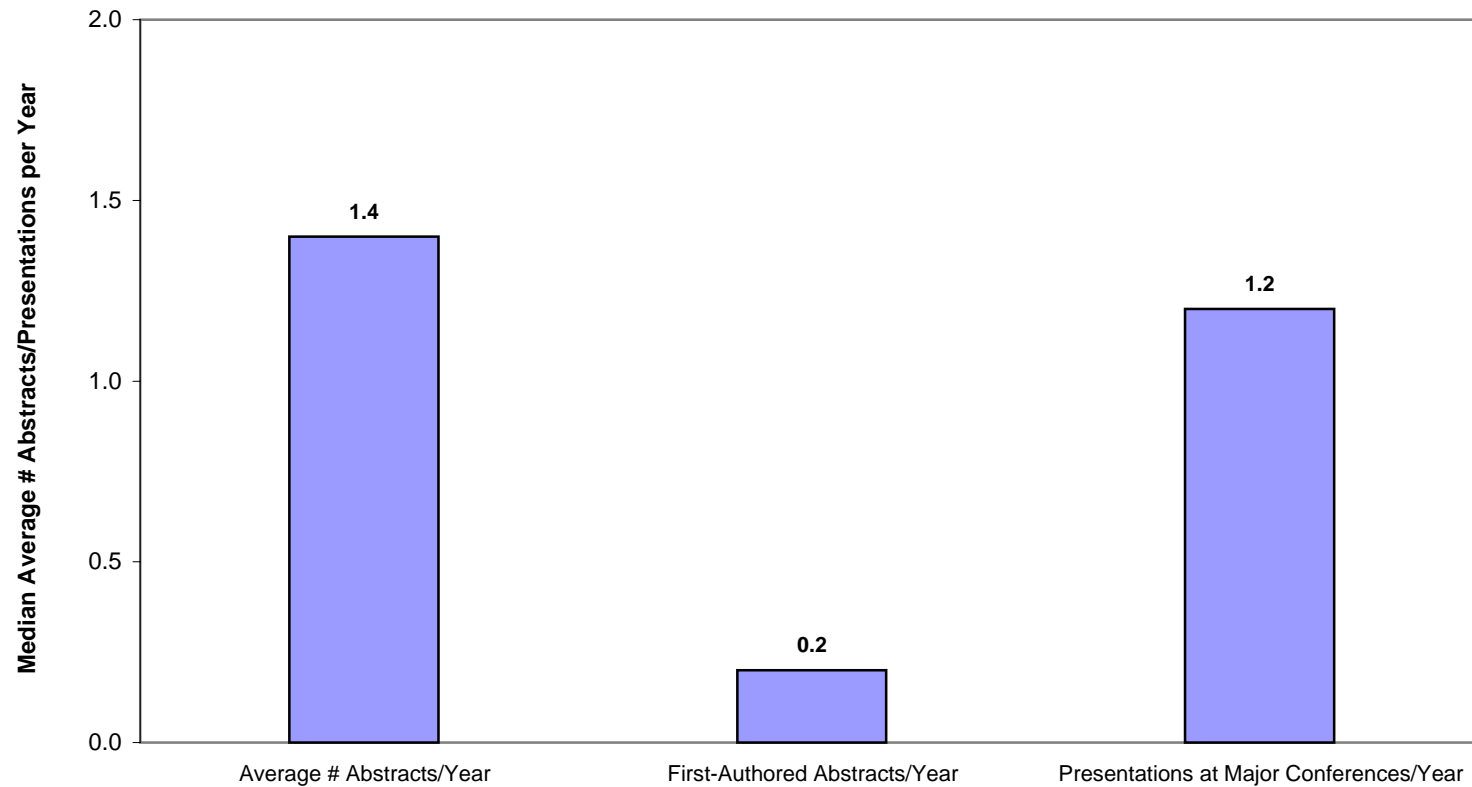
\*\*\* Significant improvement in performance ( $p < .001$ ).

Based on an analysis of peer-reviewed scientific articles published each year by the non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107), comparing their performance before and after they joined the program (through Sept 2007). Sole-authored articles were counted as first-authored but not senior-authored publications. Data source: PubMed.

Exhibit 21

Process Evaluation of the COBRE Program

**Average Number of Abstracts and Presentations Per Year After Joining COBRE**

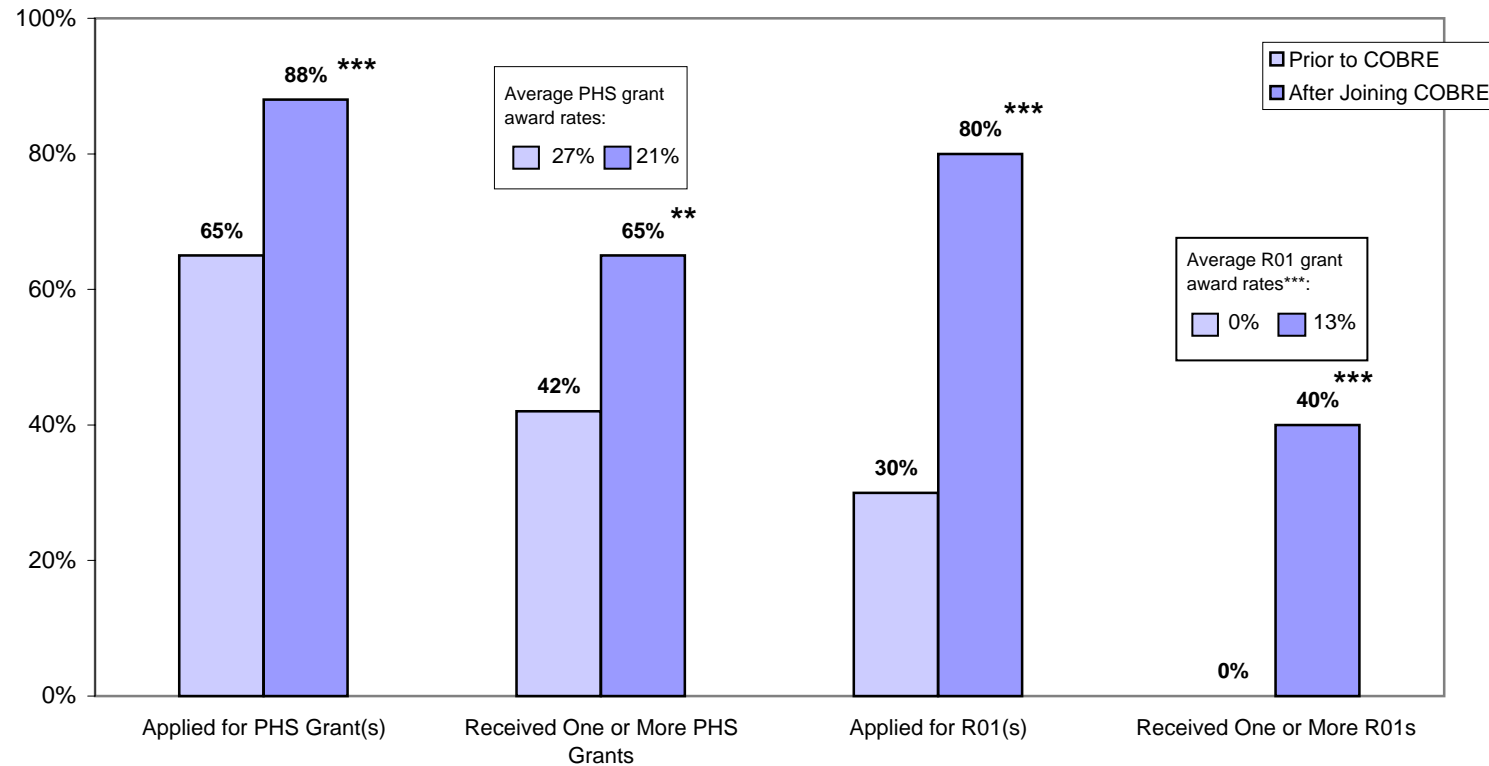


Based on an analysis of abstracts and presentations given at major research conferences per year by the non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107), from the time they joined the program through Sept 2007. Data source: COBRE annual progress reports.

## Exhibit 22

### Process Evaluation of the COBRE Program

#### Percent of Junior Investigators Who Applied For / Received a PHS Grant (Compared to Pre-COBRE Performance)



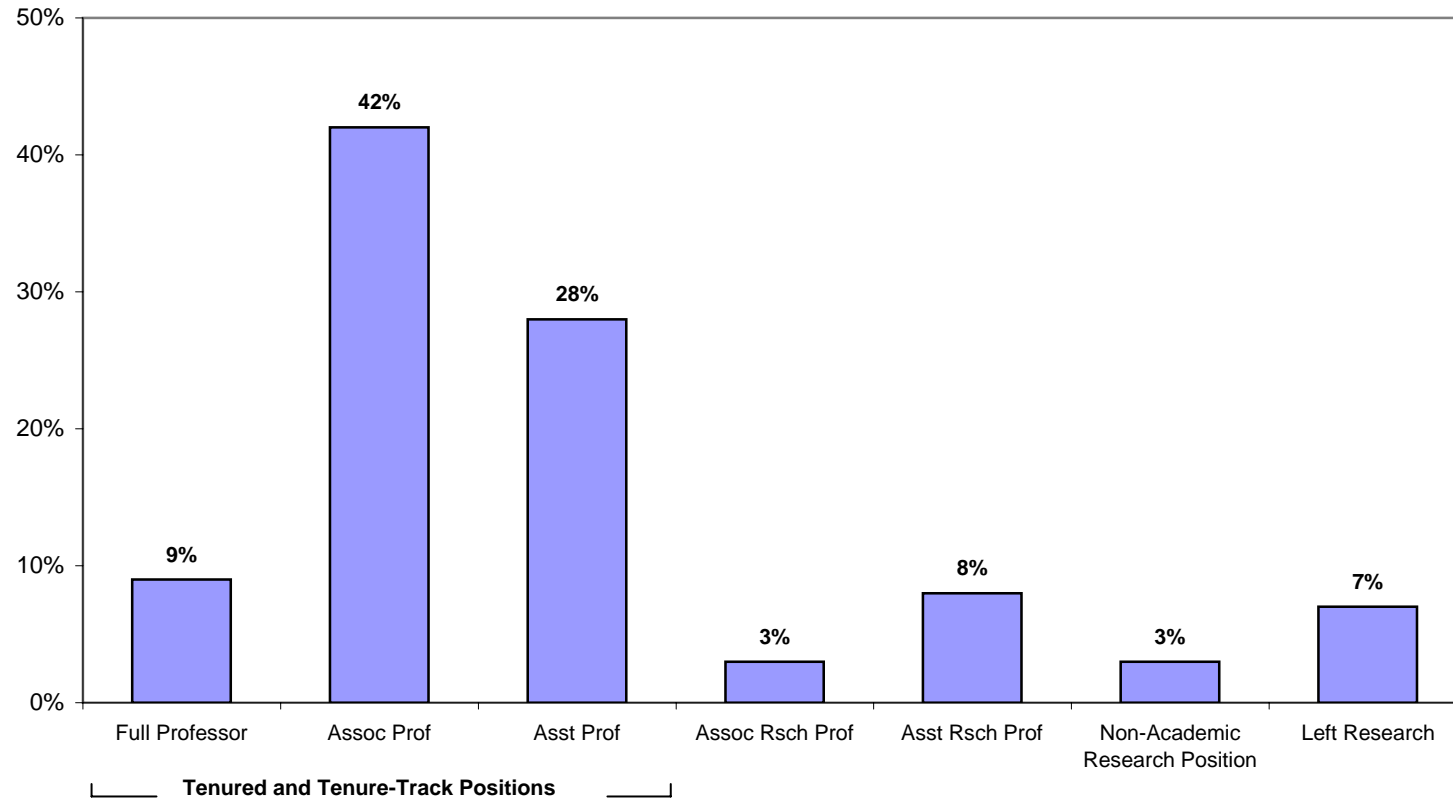
\*\*\* Significant improvement in performance ( $p < .001$ ). \*\* ( $p < .01$ )

Based on an analysis of competitive PHS grant applications submitted by and awarded to the non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107), comparing their performance before and after they joined the program (through Sept 2007). PHS subprojects were counted as grants. **Average Grant Award Rate** was calculated by determining for each grant applicant the percent of his/her applications that were funded, and then averaging these percents for the group as a whole. Data source: IMPAC II.

Exhibit 23

Process Evaluation of the COBRE Program

**Types of Academic Positions Held by Junior Investigators**

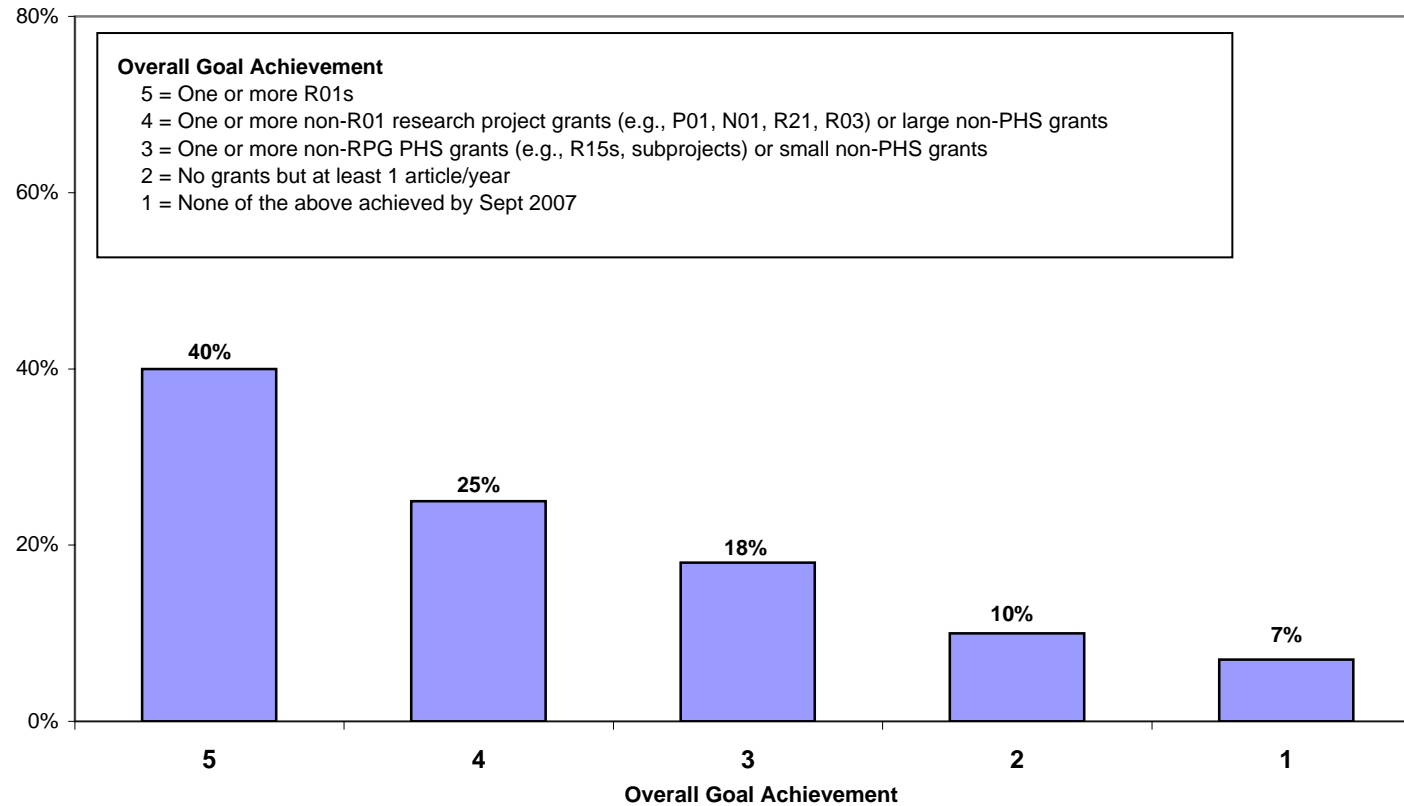


Based on an analysis of the positions held by the non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107) as of Sept 2007. Data sources: IMPAC II, web searches.

Exhibit 24

Process Evaluation of the COBRE Program

**Overall Achievement of Program Goals by Junior Investigators**



Each non-R01 junior investigator who received substantial COBRE support during Years 1-3 (N=107) was given only one rating summarizing the extent to which the person achieved the major goals of the program by Sept 2007, based on the person's PHS grants and peer-reviewed publications after joining COBRE. Average Grant Award Rate was calculated by determining for each grant applicant the percent of his/her applications that were funded, and then averaging these percents for the group as a whole. Data sources: IMPAC II, PubMed, web searches.

## **Q6. Did any COBREs experience positive or negative events over which they had no control?**

- The most difficult unforeseen challenge was loss of the PD or associate PD due to unexpected death or departure from the institution
- Some centers faced unanticipated state and/or institutional funding constraints
- Some faced lengthy delays in hiring new personnel and construction/renovation of new facilities
- A few centers experienced very positive events (e.g., substantial increase in state funding for research, institutional decision to create more research positions)

## Major findings of the evaluation

- There was considerable variation among the 18 COBREs with respect to their baseline characteristics, implementation of different program activities, and emphasis on specific goals
- The centers did an excellent job of recruiting and retaining new research faculty, core directors, and EAC members, but more attention should be given to recruiting female junior investigators
- A large majority of junior investigators (over 80%) achieved a reasonably high level of research success and performed as well as a group of K22 awardees with similar baseline characteristics, but several centers could enhance their mentoring programs
- The COBRE program has been very effective in strengthening the research infrastructure of the participating institutions
- The success of the program has been broad-based; 13 centers (nearly 75%) performed exceptionally well in one or more areas

## **Strategies found to be most effective**

- Conducting rigorous assessments of research progress and monitoring core facilities
- Emphasizing pilot projects as well as subprojects
- Developing a good COBRE website and other outreach strategies
- Establishing a formal mentoring program, selecting mentors with care, and giving junior investigators a supportive environment with adequate protected time, postdocs, and constructive feedback
- Selecting EAC members with care, communicating with them on a regular basis, and encouraging them to assess junior investigators
- Reaching out to senior administrators, communicating with them on a regular basis, and encouraging them to serve on the IAC
- Leveraging COBRE funds to obtain additional support for the center

## **Other factors related to success**

- Strong state support for research
- Strong institutional support for research
- Fortuitous timing of the COBRE initiative

## Conclusions

- The evaluation findings illustrate how effective the COBRE program has been in strengthening the research infrastructure of institutions located in IDeA states
- The results also underscore the success of the COBRE program as a mechanism for training junior investigators
- Many COBRE participants commented on how much they have benefited from the program